

Remittances, consumption patterns and household investment: The case of Zimbabwe

Advanced policy-focused poverty analysis in Zimbabwe



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CONTENTS

ACKNOWLEDGEMENT.....	2
ABSTRACT.....	4
1. INTRODUCTION.....	5
2. LITERATURE.....	8
3. METHODOLOGY AND DATA.....	9
4. DATA USED FOR THE STUDY.....	15
5. EMPIRICAL RESULTS OF THE STUDY.....	16
6. ROBUSTNESS CHECK USING THE MULTINOMIAL TREATMENT REGRESSION (MTR) APPROACH.....	18
7. CONCLUSION.....	20
REFERENCES.....	23
TABLES.....	26
FIGURES.....	38
APPENDIX.....	47

Abstract

Using nationally representative household survey data on Zimbabwe we utilize propensity score matching and multinomial treatment regression approaches to investigate the impact of domestic and international remittances on household expenditure. The results from the propensity score matching approach suggest that remittances, in general, tend to stimulate all categories of household expenditure (food, durables, education and health), indicating that remittances tend to reduce liquidity constraints faced by households in Zimbabwe. We find that domestic remittances increased expenditure on food and healthcare emergencies but had no impact on durables and education. International remittances, on the other hand, stimulated the expenditure on all expenditure categories (including on durables and education). Furthermore, households that received international remittances witnessed larger increases in all categories of expenditure, compared to domestic recipients. This suggests that international remittances are important in not only reducing household liquidity constraints but in stimulating expenditure on important household investment in durables and education. We also found corroborating evidence when using the robustness checks from the multinomial treatment regression approach. That domestic remittances largely stimulate expenditure on food and health care emergencies while international remittances stimulate expenditure on all household categories indicates that households treat domestic and international remittances differently. This suggests that households perhaps consider domestic remittances to be compensatory and international remittances to be transitory income.

1. Introduction

When it comes to international financial flows to developing countries researchers have tended to give greater attention to foreign direct investment (FDI), portfolio investment and official development assistance (ODA). Since the late 1990s development economists have however started paying more attention to remittances sent home by international migrants (Yang, 2011). This is because international remittances to developing countries have significantly increased, sometimes exceeding ODA and sometimes even approaching the magnitudes of FDI¹. Given the large magnitudes of remittances and also the fact that they are a more stable financial resource (compared to FDI, for example) researchers have expended more research effort (by conducting both macro and micro level studies) to better understand the drivers and impact of international remittances².

Important questions have been raised in the literature regarding household usage of remittances (Adams and Cuecuecha, 2013, 2010). For example, how are remittances used by households in the migrant source countries and what is the impact of such remittances on poverty? There is no consensus on the impact of international remittances: findings on the usage and impact of remittances tend to be either optimistic or pessimistic. For example, Chami, Fullen and Jahjah (2003)³ argue that a significant proportion of remittances are used to finance status-oriented consumption goods and, when invested, the remittances are invested inefficiently⁴. This view is however challenged by Adams and Cuecuecha (2010, 2013), Yang (2008), Randazzo and Piracha (2019) and Osili (2004) who argue that households that receive remittances tend to use a significant proportion of it on household investment goods such as health and housing⁵. In fact, Adams and Cuecuecha (2010) found that households receiving international remittances tend to spend less on food consumption and more on education and housing.

In the extant literature it is argued that the household is the main decision unit that determines how remittances are used (Randazzo and Piracha, 2019). The impact of remittances on household expenditure or even its developmental role depends on how remittances are perceived by the households. Remittances are perceived in three

¹ According to the World Bank's World Development Indicators database, in 2018 international remittances to developing countries was more than USD 500 billion and Zimbabwe received almost USD 2 billion from international remittances.

² Examples of macro studies include: Gupta, Pattillo and Wagh (2009) as well as Adams and Page (2005). Examples of micro studies include: Adams and Cuecuecha (2010, 2013) and Acosta (2011).

³ Also see for Entzinger (1985) and Lewis (1986) for similar sentiments.

⁴ Indeed there is some anecdotal evidence at the household level on the misuse of international remittances in Zimbabwe. For example, a migrant's remittances sent home to build a house being used for consumption purposes.

⁵ Adams and Cuecuecha (2010) investigated the impact of remittances on household expenditure and investment in Guatemala. Adams and Cuecuecha (2013) investigated the impact of remittances on household investment and poverty in Ghana. Yang (2008) investigated the impact of remittances on household investment in Philippines. Osili (2004) investigated the impact of remittances on housing investment in Nigeria.

different ways by the households: as transitory income, compensatory income or as any other income type. When they view remittances as transitory income, households tend to invest a significant amount of it more productively, investing it in education, health and physical capital. However, when they view it as compensatory income, households tend to use remittances to finance recurrent expenditure rather than use it to finance productive investments (Adams and Cuecuecha, 2013). When they perceive it like any other income type there is no expectation that households will use remittances differently.

The main objective of this study is to investigate the usage and impact of remittances in Zimbabwe. The country is an interesting case study for a number of reasons. First, the country's economic and political instability (since the early 2000s) drove a large number of Zimbabweans out of the country, with most of them migrating to South Africa, the United Kingdom and the US⁶. Given that a large number of Zimbabweans in South Africa may have entered the country illegally and may thus be unrecorded it is difficult to know the exact number of Zimbabweans that left the country since 2000. However, data (which can only be used as indicative) from the Global Migration online database shows that the number of Zimbabweans residing outside the country increased by about 2% per year (during the period 1990 to 2000) and 5% per year (during the period 2000-2017). Most of these individuals maintain social and economic ties with their families back home. They therefore send money back home. Whilst some remittances may be sent for consumption purposes or are discretionary, others may be for a specific purpose⁷ (for example, to build a house, to send a child to school, for the medical care of a relative, etc. The World Bank online database has information on remittances covering the period 1980 – 1994 and then 2009 – 2019. The information on remittances for the period 1980-1994 shows that remittances to Zimbabwe averaged about USD 10 million per year. Table 1 shows the amount of remittances to Zimbabwe for the period 2009-2019. It shows that, compared to the 1980s and early 1990s, remittances in 2009 (and beyond) had increased to billions (USD 1.2 billion in 2009). In 2012 the country received over USD 2 billion in remittances (13.17% of the country's GDP). The annual average amount of remittances during the 2009-2019 period was USD1.78 billion.

Second, most studies on remittances have focused on large remittance recipients like India, China, Mexico and Philippines. Although African countries like Nigeria, Senegal and Ghana have received some attention, smaller countries like Zimbabwe have not received adequate attention. This may be due to data unavailability⁸. Given that the structure of the Zimbabwean economy is quite different to those of the large remittance recipient countries like Mexico

⁶ Given that a large number of Zimbabweans in South Africa may have entered the country illegally and may thus be unrecorded it is difficult to know the exact number of Zimbabwean that left the country since 2000. However, data (which can only be used as indicative) from the Global Migration online database shows that the number of Zimbabweans residing outside the country increased by about 2% per year (during the period 1990 to 2000) and 5% per year (during the period 2000-2017).

⁷ According to Yang (2011) another important question is whether migrants have or desire greater control over how family members back home use the remittances they receive.

⁸ The study uses survey data from the Poverty Income, Consumption and Expenditure Surveys (PICES), which were conducted in 2011 and 2017. The PICES is one of the few data sources with a module on remittances.

or Philippines, it is important to investigate how Zimbabwean households perceive and spend remittances. Also, given that data on remittances is categorised into internal and international remittances, it is important to assess if the two types of remittances are spent differently and if they have different impacts.

Table 1: Remittances in Zimbabwe: 2009 - 2019

Year	Remittances ⁹ (USD in Millions)	GDP ¹⁰ (USD in Millions)	Remittance as % of GDP
2009	1205.66	10 061.94	11.98
2010	1413.25	12 041.66	11.74
2011	1919.48	13 750.84	13.96
2012	2113.58	16 042.47	13.17
2013	1890.28	16 361.64	11.55
2014	1903.97	16 750.54	11.37
2015	2046.58	17 048.68	12.00
2016	1856.04	17 177.55	10.81
2017	1729.88	17 985.58	9.62
2018	1729.88	18 854.23	9.18
2019	1773.49	17 327.04	10.24

Source: WDI Online Database

For policy makers understanding how remittances are spent is important. If it is true that remittances are used inefficiently or are for conspicuous consumption, it may be necessary to come up with incentives to encourage better usage. Given the many Zimbabweans that left the country since the early 2000's, it is important to have a clearer understanding of not only the amount of resources being remitted but the impact of such remittances on the welfare of those left behind. For examples, are the remittances being considered as transitory income and thus being used for capital investments into education, health or housing? Or are they being perceived as compensatory income and thus being used to finance more recurrent consumption rather than into investment goods? Or do households simply view remittances like any other income and therefore do not give them any special treatment. Understanding all these issues will help the government craft the right policies to ensure efficient remittance usage, enhancing the impact of remittances on the welfare of its citizens and harnessing them for development.

It also is important to note that the Zimbabwean government since independence in 1980 invested significantly into education. A large number of those that left the country may have

⁹ Constant 2010 USD in millions.

¹⁰ Constant 2010 USD in millions.

benefitted from the investment into education. Although the brain drain may be considered harmful to the country, the inflows of remittances into the country from those in the diaspora is therefore a welcome move that can help the government revitalise the education and health sectors, whose infrastructure has been deteriorating for quite some time.

Given the above, the main objective of the study is to assess the impact of remittances on household consumption patterns and household investment. More specifically, the study seeks to: (a) investigate if the consumption patterns of households receiving remittances are different to those not receiving remittances; (b) investigate if household investment (into health, education and housing) of households receiving remittances are different to those not receiving remittances; (c) investigate if the impact of internal remittances differs to that of international remittances and (d) suggest policy implications emanating from the study. The study utilises household level survey data from the 2011 and 2017 Poverty Income Consumption and Expenditure Survey (PICES) conducted by Zimbabwe National Statistics Agency (ZNSA).

2. Literature Review

There is a dearth of literature on micro-based studies that investigate the impact of remittances in Zimbabwe. Unlike the current study which uses nationally representative survey data, most studies on Zimbabwe are case studies that focus on certain regions in the country. Those that cover the entire country are mostly descriptive in nature and therefore do not adequately assess the impact of immigration (remittances) on poverty or household expenditure. Examples include Nzima (2017), Chikanda and Dodson, (2013), Ncube and Gomez (2011); and Tevera and Chikanda (2008). Nzima (2017) used survey data covering people from Zimbabwe's Tsholotsho district as well as Zimbabweans based in South Africa to investigate the usage of remittances by Zimbabweans in Tsholotsho. He found that the majority of remittances by migrants from Tsholotsho have been used to cushion family members from poverty while a little has been used for investments and savings (Nzima et al., 2017b). Using survey-based data Chikanda and Dodson (2013) assessed the remitting patterns of emigrant Zimbabwean medical doctors and found that they were sending remittances to their families to cushion them against the harsh economic climate in the country. Ncube and Gomez (2011) also use survey data covering Tsholotsho District in Zimbabwe to explore the link between remittances and local development. They found that households in Tsholotsho used some of their remittances to acquire farming equipment and tended to invest mostly in traditional agricultural activities. In Mugumisi (2014) survey data was used to investigate reasons why Zimbabweans based in South Africa and Botswana send remittances back home. He found the following as the major motives: pure altruist, self-interest, implicit family agreements, and portfolio investment. Using 2005 household-level survey data covering 723 households in Zimbabwe, Tevera and Chikanda (2008) explore the impact of remittances on poverty. They argue that remittances reduced vulnerability to hunger, ill-health and poverty in both rural and urban households. The study shows that remittances are mostly used for the consumption of food, school fees,

medical expenses, and building. A small number of households have been able to use their remittances to increase income through the purchase and sale of goods or in investment in transportation or farming.

From the above analysis, we note that the studies largely look at the motivation to remit and not on the relationship between remittances and household consumption. This study seeks to fill this gap in the literature. This study especially follows the approaches used by Adams and Cuecuecha, (2013), Adams and Cuecuecha, (2010), Acosta (2011), Randazzo and Piracha (2019), Cox-Edwards and Rodriguez-Oreggia (2009). Randazzo and Piracha (2019) use nationally representative survey data from Senegal as well as a combination of the propensity score matching and multinomial treatment regression approaches to investigate the impact of remittances on household expenditure. They found that remittances stimulate household expenditure but domestic and international remittances were not treated differently by the households in Senegal. In Adams and Cuecuecha (2013) the two-stage multinomial selection model is used to investigate the impact of remittances in Ghana. It is found that remittances tend to reduce poverty among Ghanaian households. More importantly, it is found that remittances stimulate expenditure on health, education and housing. These results on Ghana corroborate findings by Adams and Cuecuecha (2010) on Guatemala. Cox-Edwards and Rodriguez-Oreggia (2009) however found that remittances did not really affect labour force participation rates in Mexico. Acosta (2011) used survey data from El-Salvador and found that remittances had no effect on schooling even though it tended to reduce the extent of child labour in El Salvador. These mixed results indicate that the debate on the impact of remittances remains unsettled and that more country-level studies that adequately capture country specific factors are need to be conducted.

3. Methodology and data

The objective of this study is to investigate the impact of remittances on household expenditure. There are two main problems that may affect the study results: selection bias and simultaneity (Adams and Cuecuecha, 2013). First, migration and sending remittances are selective processes. The households receiving remittances and those not receiving remittances may be systematically different. For example, compared to their non-receiving counterparts, households receiving remittances may be more motivated and less risk averse. Second, choices made by households that lead them to being poor may be correlated to their choice of whether or not to receive remittances (Adams and Cuecuecha, 2013). An ordinary least squares regression approach may therefore fail to establish the causal relationship being investigated.

To mitigate the above identification challenges we use two main identification strategies i.e. propensity score matching and multinomial treatment regression (MTR) approaches to investigate the usage and impact of remittances. These approaches have been used by a number of authors in the literature. See for example, Adams and Cuecuecha (2013) on Ghana, Adams and Cuecuecha (2010) on Guatemala, McKenzie (2006) on Mexico, Randazzo and Piracha (2019) on Senegal, and Acosta (2011) on El Salvador.

(a) The Propensity Score Matching Approach

This study uses the propensity score matching approach to investigate the impact of remittances on household expenditure. Whilst there are a variety of other quasi-experimental approaches¹¹, the Propensity Score Matching (PSM) approach seems to be appropriate given the data at our disposal. For example, it works quite well even when used with cross sectional data¹². Like any other quasi-experimental approach the PSM estimator seeks to solve a missing data problem. In this particular case the missing data problem arises from the fact that we only observe households that receive remittances but we do not know what their expenditure would have been if they did not receive remittances (counterfactual). That is, we cannot at the same time observe the same households with and without the remittances. Properly matching households receiving remittances and those not receiving remittances will help create the counterfactual. In order to match the remittance recipients to non-recipients we start by running a probit regression. The equation is stated as follows:

$$P_s = f(\text{household characteristics, regional characteristics}).....(1)$$

Where P_s is a dummy variable taking a value of 1 if a household received a certain type of remittances and 0 if not. Where s stands for the type of remittance received; we classify households into three mutually exclusive states: not receiving any remittances, receiving internal remittances only, and receiving international remittances only. Another possible state is the combined one where a household receives both internal and international remittances. We will therefore conduct the matching based on these different states. Specifically, we match households that receive internal remittances only to households that do not receive remittances to estimate the impact of domestic remittances. Similarly, we estimate the impact of international remittances by matching households that receive international remittances to non-recipient households. Lastly, we will combine the internal and international remittance recipients to estimate the impact of remittances in general. Working with these different categories of remittances will help us investigate if these two types of remittances have different effects on household expenditure.

If we consider a remittance recipient to be a treated unit and therefore a programme participant – as in impact evaluation literature – we can then state that being selected into the programme may be a function of a number of characteristics. These characteristics include household and regional characteristics. They for example include: household wealth level, household size; age, gender, ethnicity, educational level of household head, household farm/plot size, rural/urban dummy, provincial regional dummies. The following equation shows the probit/logit regression used to estimate the propensity score:

¹¹Examples include regression discontinuity approach, difference-in-difference and instrumental variable approaches.
¹²The PICES data used for the analysis is cross-sectional.

Prob (Y=receive remittances) = f(education level of HH, age of HH, gender of HH, ethnicity of HH, household size, size of land owned by household, whether household has children below age 5, number of adults in the household, urban/rural dummy, provincial dummy).....(2)

When selecting the covariates to be included in the above model we especially need those variable that are likely to affect the probability of receiving the remittances. That is, we select characteristics that are not affected by the outcome but do affect participation (receiving remittances). For example, in our case we do not expect variables like age, gender, ethnicity, rural/urban dummy, provincial dummy, etc., to be affected by the status of being a remittance recipient. After selecting the right characteristics, we run the above regression and estimate the propensity score. The estimated propensity scores gives us the probability of receiving remittances. The propensity scores capture the combined effects of the likelihood of receiving remittances thereby avoiding the curse of dimensionality.

After estimating the propensity scores the next step is to then use the scores to match households receiving remittances to those not receiving remittances. Households receiving remittances that have propensity scores that are closer to those that are not receiving are matched. The expectation is that, if matching was done correctly, the expenditure patterns observed for non-remittance recipients is what we would have observed for the recipients. That is, the matched households not receiving the remittances are the counterfactual for the households receiving remittances. In the literature, several matching algorithms are used to conduct the matching. They include: the nearest neighbour, radius or caliper estimator, stratified or interval estimator and kernel method (Imbens and Rubin, 2015; Soderbom et al, 2015; Guo and Fraser, 2010). For this particular study the nearest neighbour, caliper and kernel estimators were used. The above procedure helps to establish a working sample¹³.

With the nearest neighbour matching estimator, for each remittance recipient, we find a non-recipient household with the closest propensity score and match the two. The difference in outcomes for each matched pair is calculated, with the ATT being the average of the estimated differences (Randazzo and Piracha, 2019; Imbens and Rubin, 2015; Soderbom et al, 2015; Guo and Fraser, 2010). One weakness of the nearest neighbour estimator is that it can easily yield bad matches, particularly if the difference between the propensity scores for a treated household and its closest untreated counterpart is high. To avoid this problem of bad matches one can use the caliper (also known as radius) matching estimator. The caliper estimator imposes a maximum distance between two neighbours being matched: a neighbour lying outside the threshold is excluded and only those falling within the caliper are used (Dehejia and Wahba, 2002). We will use the commonly used thresholds: 0.01, and 0.05. The choice of the threshold must take into account the fact that a very low threshold, while giving us the best matches, may come with very few such matches while a very high threshold, while giving us a high number of matches, comes with a large number of bad

¹³ One needs to check for balance on variables used to calculate the propensity score (Imbens and Rubin, 2015).

matches. The interval matching estimator divides the common support region into intervals and calculates the programme impact within each interval. The weighted average of these impacts is then the programme impact (Shahidur et al, 2010). The kernel matching estimator is a non-parametric estimator which matches a treated unit with a weighted average of all untreated units, with the closest units receiving more weight (Shahidur et al, 2010).

Each of the above matching estimator has its advantages and drawbacks. None of them can be considered more superior than the other. According to Soderbom et al (2015) one weakness of the propensity score matching approach is that there is no guidance in the literature on the choice of matching estimators. The superiority of a given matching estimator may therefore depend on the context and data being used (Randazzo and Piracha, 2019). We will therefore conduct the matching using all the above estimator for robustness. Depending on the results emanating from the matching it is also possible to test and ultimately select the best estimator among those used ala Hausmann test when choosing between random effects and fixed effects model. The procedure entails using only those households that did not receive any remittances. We will start by estimating their propensity score, randomly assign some into a treatment group and some into a control group, conduct some matching using all the above matching estimators and then estimate an impact. Given that we are only using the control group (that is, those who are not receiving remittances) the expectation is that there should not be a significant difference in the household expenditure for those assigned into the “control” and “treatment” groups (i.e., no impact). The best matching estimator therefore should be the estimator that tells us that there is no difference in the outcome (household expenditure in this case) between these two groups that are essentially the same.

For credibility, the PSM approach requires two important assumptions to hold. These are the overlap condition and the conditional independence assumption (CIA) (Imbens and Rubin, 2015). The common support or overlap condition ensures that there is sufficient overlap in characteristics of the treated and untreated units to find adequate matches (Imbens and Rubin, 2015; Soderbom et al, 2015; Guo and Fraser, 2010). Those that fall outside the common support region are dropped and only those households (in the treatment and control groups – i.e., those receiving and not receiving remittances) falling in the common support region will be used for the analysis. The CIA states that the potential outcomes must, after controlling for the observable characteristics, be independent of treatment status. This means after controlling for the household and regional characteristics, the treatment assignment (i.e., whether one is receiving remittances or not) would be as good as random. This reduces selection bias and thus helps in creating a more credible control group or counterfactual. It must be noted that whilst one can check for the existence of common support the CIA cannot be tested for. A clear understanding of the context being studied is important for one to be sure that indeed the CIA is less likely to be violated.

(b) Weaknesses of the Propensity Score Matching Approach

Like any other estimator the propensity score matching approach has a number of weaknesses. Firstly, the CIA condition may fail to hold (Gertler et al, 2011). This may then affect the randomness of treatment assignment. Secondly, the PSM approach assumes that participants and non-participants are matched based on observable characteristics. It is however possible that unobservable characteristics like household head's innate ability, level of risk aversion, household's commitment level, among others, may affect participation¹⁴, creating or worsening the selection bias problem as the treatment and control group may be systematically different due to the unobservable characteristics¹⁵. Thirdly, the PSM estimator, which is also highly data-hungry, may be affected by the absence of common support. Some of the above weaknesses can be corrected by, for example, combining the PSM and difference-in-difference approaches. We however do not have adequate data to use this particular approach.

(c) The Multinomial Treatment Regression (MTR) Approach

Even though the PSM approach described above helps create a counterfactual and a resultant impact, it still has the disadvantage in that it fails to control for unobservable characteristics. Households receiving remittances may therefore be systematically different to households not receiving. This may affect both the migration-remit decision as well as the outcome. To reduce the selection bias we use the multinomial treatment regression approach (with and without instrumental variables)¹⁶. It must however be noted that according to McKenzie et al (2010) and McKenzie and Sasin (2007) in the absence of a good IV the PSM, compared to other quasi-experimental approaches, performs quite well and may even be better than a poor instrument (Randazzo and Piracha, 2019).

The MTR approach was proposed by Deb and Tirivedi (2006) and Deb (2009) and has been used by a number of authors including Randazzo and Piracha (2019), Adams and Cuecuecha (2010), and Adams and Cuecuecha (2013). The approach is made up of two main components: an outcome equation and a selection equation. The two components are linked by observed and unobserved characteristics (Randazzo and Piracha, 2019). For our purposes, the outcome variable in the model is household expenditure or budget share and the treatment variable is remittance receiving status. The remittance receiving status has three categories: no remittances received, only domestic remittances, only international remittances received. The selection equation estimates the probability of a given household receiving a certain type of remittance (any of the three remittances types stated above). Following Randazzo and Piracha (2019) and Adams and Cuecuecha (2013) the probability that a given household receives a certain remittance type is given by:

$$Pr (Rem_{aj} | z_j l_j) = \frac{\exp (z'_i \alpha_j + \delta_d l_{jd})}{1 + \sum_{k=1}^D \exp (z'_j \alpha_k + \delta_d l_{jk})} \dots\dots\dots(3)$$

¹⁴ And also outcomes that are being evaluated. For example, the choice of expenditures level.

¹⁵ Unfortunately, the presence or absence of selection bias cannot be tested for (Gertler et al, 2011).

Where REM_{dj} is a dummy variable capturing each of the remittance statuses. The probability depends on household characteristics captured by the variable Z_i and a latent factor I_{jd} (Randazzo and Piracha, 2019). The latent variable I_{jd} captures the unobserved household characteristics affecting the probability of receiving remittances. More specifically the model to be estimated in first stage is:

*Prob (Y=receive remittances) = f(education level of HH, age of HH, gender of HH, ethnicity of HH, household size, size of land owned by household, whether household has children below age 5, number of adults in the household, **instrumental variables**, urban/rural dummy, provincial dummy).....(4)*

Where *HH* stands for household head.

Because we are trying to estimate the expenditure share we use the following Working-Leser model:

$$Y_{ij} = \alpha_i + \beta_i \log EXP_j + \gamma_i X_j + \theta_i REM_{dj} + \lambda_d I_{jd} + \varepsilon_{ij} \dots \dots \dots (3)$$

Where Y_{ij} stands for household j 's budget share in good i . The budget shares to be used are budget shares on: durables, food, health and education. To estimate the impact of remittances on food budget share we run equation (5) using the food budget share as the dependent variable. To estimate the impact of remittances on the education budget share, we run equation (5) using the education budget share as the dependent variable¹⁷. The variable X_j stands for household characteristics, REM_{dj} is a dummy variable capturing each of the remittance statuses. For example, if for household j , the impact being assessed is the impact of domestic remittances, REM_{dj} would take a value of **1** if household received remittances and 0 if not. This is then repeated for the other mutually exclusive remittance status categories. EXP stands for total household expenditure, θ_i is the parameter of interest. It shows the effect of the different categories of remittances on household expenditure or budget share. The variable I_{jd} represents the selection correction variable, and shows us the extent of the correlation between unobservable remittances determinants and the household expenditure or budget share.

Depending on what the household spends its money on, household expenditure will be categorised into the following categories: food, health, education, durables and other. The MTR model is estimated using STATA 16's "mtreatreg" command. We start by estimating the above framework in the absence of instrumental variables and then, for robustness, add instrumental variables. Randazzo and Piracha (2019) estimate their model without the instrumental variable and simply rely on the nonlinear functional form of the remittance status equation.

¹⁷ A similar procedure is followed for the rest of the budget shares.

We use two instrumental variables to address the problem of endogeneity. The instrumental variables are distance to the post office and distance to growth points. In Zimbabwe post offices have traditionally been used as points to receive registered mail and money, particularly by those in the rural areas. For example, money sent to a rural household may be sent to a relative residing in urban areas, who then forwards it, through the post office located in the rural areas, to its final recipient. The growth points are also another channel used to send money to those in rural areas: money from the diaspora is received in towns and then get forwarded to the rural recipients for collection at a growth point. The shorter the distance to the growth point or post office the cheaper or easier it is to send remittances. So the distance to the post office or growth point is related to the probability of receiving remittances. Distance to the post office is however unlikely to influence household expenditure¹⁸. It is however possible that those closer to growth points may spend more than those staying far. We therefore think that distance to the post office may be a better instrument than distance to growth points. We however use both and interpret our results with that weakness in mind.

4. Data used for the study

This study uses the data from the Poverty Income Consumption and Expenditure Survey (PICES) for 2011 and 2017. The 2017 survey contains more than 30 000 households and the 2011/12 PICES contains 29 765 households. The nationally representative surveys contain information on different aspects of living conditions in Zimbabwe, including consumption expenditure, household income, informal sector contribution, poverty and inequality issues and social welfare interventions by the government. More important for this study, the surveys also contain information on income transfers within and outside the country. It includes an international migration module which probes for information on migration including the characteristics of people that emigrated from Zimbabwe. It also includes information on households that received remittances: domestic and international remittances. The study uses information on general household characteristics as well as that on remittances to investigate the impact of remittances. More relevant for our purposes are the following survey questions:

Question 109: Did (name) send (cash/in-kind) remittances back home in the last 12 months?

Question 110: What is the value of remittances (both in cash and in kind) sent by (name) in the last 12 months?

Question 111: What is the value of remittances sent by (name) last month?

The total household expenditure is the outcome of interest. For an in depth analysis, we further categorise household expenditure into food, health, education and durables budget shares. Tables 2 and 3 show the consumption expenditure distribution as well as the variable summary statistics for both surveys years. Table 4 shows the expenditure

¹⁸ The first stage results shown in Table 13 and 15 for the MTR approach show that households located close to a post office or growth point are more likely to receive remittances.

patterns for remittance recipients and non-recipients. Tables 2, 3 and 4 all show that, for the years 2011 and 2017¹⁹, households that receive remittances tend to spend more on all expenditure categories (food, education, health and durables) than those that do not receive remittances. Regarding other household characteristics we find that 68% of the non-remittance recipient households were male-headed, while 43% of the remittance recipients were male-headed (See Table 2). This may indicate that a large number of male household heads were migrating and sending remittances, hence the low proportion of male-headed households in the remittance receiving category. In terms of the population distribution by age group, we find that household heads aged 30-39 years dominated the other age groups (22% of them in remittance receiving households, 29% of them in the non-remittance receiving households). Migration seems to be a function of education and unemployment. For example, 50% of the remittance receiving households had household heads with secondary education, compared to 48% for non-remittance receiving households. Ten percent of the remittance receiving households had a family member with tertiary education, compared to 7% for the non-remittance receiving households. Families with larger shares of unemployed adults were likely to receive remittances. The share of unemployed adults was 21% for the remittance receiving households but only 4% for non-remittance receiving households. Regarding the provincial distribution of households receiving remittances we find four provinces to be dominant (accounting for 60% of remittance receiving households), namely: Harare (19%), Midlands(16%), Manicaland (14%) and Bulawayo (11%).

5. Empirical Results of the Study

This section presents results from the PSM and MTR approaches. The PSM approach has two main steps. The first step entails estimating the propensity scores which are then used to conduct the matching (matching the remittance recipients to non-remittance recipients) and to estimate the average treatment effect on the treated (ATT) in the second step. Table 5 and 6 present the first step results for the years 2011 and 2017, respectively. Table 7 shows the ATT results for both the years 2011 and 2017. We use the following matching estimators to estimate the ATT: nearest neighbour, caliper and kernel estimators. The remittance recipients were categorised into three main groups: domestic remittance recipients only, international remittance recipients only and those that received either domestic or international, or both international and domestic remittances. When it comes to the category of remittance recipients that received either domestic or international or both domestic and international remittances, the results suggest that remittances (for both years) had a positive and significant effect on all categories of household expenditure. For example, in 2011 (2017) households that received any kind of remittances spent an additional USD10²⁰ (USD6.56) per month on food than they would have spent if they did not receive remittances. Similar patterns are also observed for other expenditure categories. For this treatment category, the ATT estimates for both years and across all the categories of

¹⁹ We observe a more or less similar pattern when looking at the descriptive statistics for the survey years 2011 and 2017. In this section we therefore focus on the 2017 data, the more recent data.

²⁰ Using the Kernel matching estimator.

household expenditure were positive and significant, regardless of the matching estimator used. This suggests that remittances help in relaxing the budget constraint for households, enabling them to increase household expenditure. It is however important to separate remittance recipients (domestic versus international remittance recipients) as this enables us to further investigate if households perceive domestic and international remittances differently.

When it comes to domestic remittances we find that they have a positive and significant effect on the food and health care categories of expenditure²¹. For example, in 2011 (2017) domestic remittance recipients spent an additional USD6.32 (USD4.77) per month on food than they would have if they did not receive remittances. The ATT estimates for the food category is positive and significant (for the 2011 data the ATT is significant at the 1% level regardless of the matching estimator used and for the 2017 data it is significant at 10% level when using the nearest neighbour and at the 1% level when using the caliper and the kernel matching estimators). The ATT estimates (when using the 2011 data) for the health expenditure category are positive and significant (at the 10% level when using the nearest neighbour and caliper matching estimators, and at the 5% level when using the kernel matching estimator).

Regarding the impact of international remittances on household expenditure, we find that in 2011 (2017) those that received international remittances spent an additional USD20 (USD17.65) per month on food than they would have spent if they did not receive remittances²². A similar pattern is observed for the other expenditure categories and matching estimators. Across both years the ATT estimates are significant across all categories of household expenditure, regardless of the matching estimator used. For example, the ATT estimates for food (in 2011), durables (in 2017) and education (in 2017) were positive and significant at the 1% level, regardless of the matching estimator used. For 2017 the food ATT was significant at the 1% level (when using the caliper and kernel matching estimators) and 5% level (when using the nearest neighbour matching estimator). The ATT for durables was significant at the 10% level when using the caliper and nearest neighbour matching estimator. When using the 2011 data, the ATT for education expenditure was significant at the 1% level (when using the nearest neighbour and kernel matching estimators) and at the 5% level when using the caliper matching estimator. When using the 2017 data, the ATT estimate was significant at the 1% level (when using the caliper and kernel matching estimators) and 5% level when using the nearest neighbour matching estimator. The ATT estimate, when using the 2011 data, for the health expenditure category was significant at the 5% level of significance (when using the nearest neighbour and caliper matching estimator) and at the 1% level (when using the kernel matching estimator). When using the 2017 data the ATT estimates are significant at the 10% level, regardless of the matching estimator used.

²¹ In this category the treated are those that received domestic remittance only and the untreated are those that did not receive any remittance.

²² Using the Kernel matching estimator.

As stated in the introduction households can perceive remittances as transitory income (in which case they would spend on durables and education), or compensatory income (in which case they would mostly spend it on food or health care emergencies), or just as any other income. The evidence from the study suggests that households spend their remittances on both durables and food, so it is difficult to conclude whether they perceive remittances as transitory or compensatory income. What is clear, however, is that households in Zimbabweans perceive domestic and international remittances differently. The fact that domestic remittances seems to be used for emergencies like food and health care while international remittances are used for durables and education (in addition to food and healthcare) suggests that, to a certain extent, households in Zimbabwe may be considering international remittances to be more of transitory income (hence the expenditure in education and durables) rather than compensatory income, while they may be likely to consider domestic remittances as compensatory income (hence its use on food and healthcare emergencies).

The impact of all forms of remittances (i.e., those that received domestic or international remittances or both) on food and healthcare expenditure weakened somewhat, moving from 2011 to 2017. The impact of all forms of remittances on durables expenditure in 2017 was larger than the 2011 impact, and its impact on education expenditure in 2017 was more or equal the impact in 2011. The impact of domestic remittances on food and healthcare expenditure also declined, moving from 2011 to 2017. The impact of international remittances on food, education and healthcare expenditure weakened, moving from 2011 to 2017. The impact of international remittances on durables however increased, moving from 2011 to 2017.

Given the importance of common support when using the propensity score matching approach, we conduct some diagnostic tests to check the quality of matching. Table 8 and Figure 1 present the post-estimation results testing for the quality of matching. Figure 1 shows that there is overlap in the pcores across the three categories of treatment. Table 8 shows that matching reduced the bias by more than 99% for each treatment category. For each treatment category, the matched pcores for the treatment group were statistically identical, indicating the overall similarity between the treatment and control group, post-matching.

6. Robustness check using the Multinomial Treatment Regression (MTR) Approach

One weakness of the PSM approach is that it matches on observable characteristics and does not correct for the selection bias emanating from unobservable characteristics. In this section we use the MTR approach to assess the impact of remittances. For this approach we establish three important categories of households: households that receive no remittances (the base category), households that receive domestic remittances only and households

that receive international remittances only²³. This helps us better understand whether households treat internal and external remittances differently. We therefore have three household statuses in this section: whether a household received no remittances, whether it received domestic remittances only or whether the household received international remittances only. As stated in the methodology section the impact of remittances is estimated using two equations (equation 4 and 5). The results shown in Table 9 (using 2011 data) and Table 10 (using 2017 data) were estimated using equation 4 (from now on called first stage results). The results shown in Tables 11 and 12 (from now on called second stage results) were estimated using equation 5 and were based on the data from the years 2011 and 2017, respectively. The results based on the 2011 data show that receiving domestic remittances stimulates expenditure on durables (2.5%), healthcare (about 1%) and education (about 2%) (see Table 11). The results however indicate that receiving domestic remittances reduces expenditure on food (3.7%). The estimated parameters for durables, healthcare and education are all significant at the 1% level. The results from the 2017 data also show a positive relationship between receiving domestic remittances, on the one hand, and the expenditures on durables and education, on the other (see Table 12). When it comes to international remittances we find a positive relationship between receiving international remittances and food expenditure (using 2011 data) and between receiving international remittances, on the one hand, and expenditures on durables and education, on the other (using 2017 data). Results from the 2017 survey also show a negative relationship between receiving remittances (international remittances or domestic) and expenditure on food. This result suggests that households receiving emittances may be considering remittances to be transitory and therefore spending it on education and healthcare rather than on food. These results support findings by Adams and Cuecuecha (2010) on Guatemala, Randazzo and Piracha (2019) on Senegal and Adams and Cuecuecha (2013) on Ghana.

In order to reduce the endogeneity problems discussed in the methodology section we included distance to the nearest post office and distance to the nearest growth point as instrumental variables. As discussed in the methodology section the instrumental variables are included in the first stage but were excluded in the second stage. Tables 13 and 14 present the first stage and second stages results when using distance to the post office as the instrumental variable (using 2011 data²⁴). Table 14 results are not very different to Table 11 results (Table 11 results do not include any instruments). For example, just like in Table 11, Table 14 results indicate that receiving domestic remittances increases expenditure on durables (2.7%) and health (0.9%), and reduces expenditure on food (4.8%). The results based on the IV however indicate that receiving domestic remittances reduces expenditure on education (0.5%), unlike the results in Table 11 which indicate a positive relationship between domestic remittances and education. The impact of international remittances

²³ Households that receive both types (domestic and international) were therefore not used in this section of the study.

²⁴ We could not get data on distance to the post office or growth point when using the 2017 survey. The results using instrumental variables are therefore based on the 2011 survey data.

when using instrumental variables (compared) to the previous ones shown in Table 11 (when not using the IV method) did not change.

Tables 15 and 16 present the first stage and second stage results obtained when using distance to the nearest growth point as the instrumental variable. Just like in the previous set of results that did not use the instrumental variable, the second stage results (see Table 16) indicate that domestic remittances have a positive effect on expenditure on durables (2.7%), education (0.4%) and health (0.9%). However, we found no effect of domestic remittances on food expenditure when using distance to the nearest growth point as the instrumental variable. Table 16 also presents the impact of international remittances when using instrumental variables. The results suggest that international remittances stimulate expenditure on education (1.5%) but reduces expenditure on food and durables. It must however be noted that distance to a post office may be a weak instrument since the correlation between receiving remittances (particularly receiving international remittances) and distance to the post office is quite low (see Table 13). The same applies to distance to a growth point (see Table 15). Given the above we consider the propensity score matching results to be more reliable. According to McKenzie et al (2010) and McKenzie and Sasin (2007) in the absence of a good IV the PSM, compared to other quasi-experimental approaches, performs quite well and may even be better than a poor instrument (Randazzo and Piracha, 2019).

7. Conclusion

The study uses the propensity score matching and multinomial treatment regression approaches to investigate the impact of remittances on household expenditure using the 2011 and 2017 household survey data. The study findings suggests, and corroborates the view in the extant literature, that remittances help reduce credit constraints faced by households receiving remittances. Generally the results suggest that household perceive domestic and international remittances differently.

The results from the PSM approach suggests that remittances, in general, tend to stimulate all categories of household expenditure (food, durables, education and health), indicating that remittances tend to reduce liquidity constraints faced by households in Zimbabwe. This outcome is evident when using both the 2011 and 2017 survey data. In an attempt to assess the separate or differential effects of domestic and international remittances we used receipt of domestic remittances only or international remittances only as treatment. The results suggest that domestic remittances increased expenditure on food and health but had no impact on durables and education. International remittances, on the other hand, stimulated the expenditure on all expenditure categories (including on durables and education). However households that received international remittances witnessed larger increases in all categories of expenditure, compared to domestic recipients. This suggests that international remittances are important in not only reducing household liquidity constraints but in stimulating expenditure on important household investment in durables

and education. Furthermore, even though both domestic and international remittances seem to positively stimulate expenditure on health, international remittances have a larger impact than domestic remittances. Given the difficult economic condition faced by most households in Zimbabwe, the above results support the general view that those in the diaspora are playing a very important role in alleviating poverty in the country. In the recent past the education and health sectors have seriously deteriorated, remittances (particularly international remittances) are helping reverse a situation that could have seriously worsened.

We also found collaborating evidence when using the robustness checks from the multinomial treatment regression approach. For example, as with PSM approach, we found that domestic remittances were positively related to expenditure on durables, health and education²⁵. When using 2017 data we also found that although both domestic and international remittances stimulate expenditure on durables and education, international remittances have a larger positive impact, with the impact on durables expenditure strengthening overtime, but weakening for the rest of the expenditure categories.

It is quite evident that remittances are playing an important role in reducing the liquidity constraints faced by Zimbabwean households. It is also evident that the impact of international remittances is larger than that of domestic remittances. There is therefore need for Zimbabwean government to encourage the inflows of international remittances. One major problem is that sending remittances to Africa (or within Africa itself) is quite expensive (World Bank, 2006; Cirasino, 2013). For example, sending remittances through major corridors like US to Mexico may cost about 5% of the amount remitted while sending remittances to Africa or within Africa can cost as much as 20% of the amount remitted (World Bank, 2006). One way to do that is to reduce or regulate the cost of sending remittances from abroad. Most transfers are however conducted through private players, like Western Union, MoneyGram so it may be difficult to reduce such costs. The government can however encourage competition in the sector using a number of strategies. First, they need to reduce barriers to entry. Second, they need to allow competition between Money Transfer Operators (MTOs) and commercial banks. Third, they need to reduce capital requirements and other burdensome legal and compliance requirements for new MTOs Operators (World Bank, 2006). There is also need to open up the postal networks to the MTOs, join hands with G8 and G20 countries which are coming up with programmes to reduce the remitting cost to 5% of the remitted amount, and to develop an efficient modern payment infrastructure (World Bank, 2006; Cirasino, 2013). Increasing competition among all players involved in remittance transfers will help reduce remitting costs, which is beneficial to both the remitters and the MTOs involved. Lower costs will incentivise remitters to send more money home while increasing the volume of remittances/business for the MTOs (Cirasino, 2013). The government also needs to create better investment opportunities for those in the diaspora (e.g. the issuance of diaspora bonds to finance infrastructure) so that such

²⁵ The 2017 results from the multinomial treatment regression approach however indicate a negative relationship between remittances and expenditure on food.

resources are also used for long-term investments like housing and infrastructure (road, hospitals, schools, etc). It is also argued that enfranchising those in the diaspora may also help encourage them to send money back home. One weakness of the study is that it uses cross-sectional data. This makes it difficult for one to better investigate the dynamics around remittances and its impact. Future studies can be done using panel data and richer datasets that allow for the creation of better instruments.

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TABLES

Table 2: Summary statistics 2017

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Treatment variables															
Remittances domestic (\$)	29 555	12.5	53.5	0.0	900	24 856	0.0	0.0	0.0	0.0	4 699	70.7	109.8	0.0	900
Remittances international (\$)	29 555	6.7	47.7	0.0	1 500	24 856	0.0	0.0	0.0	0.0	4 699	38.1	108.1	0.0	1 500
Remittances (domestic + international - \$)	29 555	19.3	72.8	0.0	1 500	24 856	0.0	0.0	0.0	0.0	4 699	108.8	142.1	0.5	1 500
HH remittances recipient	29 555	0.18	0.38	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	1.00	0.00	1.0	1.0
HH remittances recipient (domestic)	29 555	0.14	0.35	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	0.81	0.39	0.0	1.0
HH remittances recipient (international)	29 555	0.04	0.20	0.0	1.0	24 856	0.0	0.0	0.0	0.0	4 699	0.23	0.42	0.0	1.0
Outcome variables:															
Food exp. (\$)	29 555	87.0	61.3	5.2	1 089	24 856	85.6	60.1	5.2	859	4 699	93.2	65.9	6.8	1 089
Non-food exp. (\$)	29 555	170.4	187.5	5.0	1 937	24 856	161.1	182.4	5.0	1 937	4 699	213.8	203.8	7.9	1 657
Total exp. (\$)	29 555	257.4	220.7	21.3	2 363	24 856	246.7	215.5	21.3	2 363	4 699	307.0	237.1	23.6	1 816
Education exp (\$)	19 843	18.9	30.6	1.2	831	16 532	17.6	24.8	1.2	532	3 311	24.6	47.9	1.4	831
Health exp. (\$)	29 555	4.6	28.6	0.0	1 430	24 856	4.0	25.3	0.0	1 430	4 699	7.3	40.6	0.0	744
Durables exp. (\$)*	29 555	77.5	167.8	0.0	2 000	24 856	74.7	166.2	0.0	2 000	4 699	90.8	174.4	0.0	1 950
Per capita food exp. (\$)	29 555	25.4	23.1	4.8	556	24 856	25.0	22.5	4.8	363	4 699	27.5	25.7	4.8	556
Per capita total exp. (\$)	29 555	78.6	86.8	8.0	1 703	24 856	75.3	83.3	8.0	1 703	4 699	94.1	100.2	9.6	1 427
Food share to total exp.	29 555	0.40	0.17	0.01	0.96	24 856	0.41	0.17	0.01	0.96	4 699	0.36	0.17	0.02	0.89
Other characteristics:															
Male headed hh	29 555	0.63	0.48	0.0	1.0	24 856	0.68	0.47	0.0	1.0	4 699	0.43	0.50	0.0	1.0
Female headed hh	29 555	0.37	0.48	0.0	1.0	24 856	0.32	0.47	0.0	1.0	4 699	0.57	0.50	0.0	1.0

	Overall					Non- recipient household					Remittance receipt household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Age (head) 16-19 years	29 398	0.01	0.08	0.0	1.0	24 724	0.01	0.07	0.0	1.0	4 674	0.01	0.12	0.0	1.0
20-29 years	29 398	0.14	0.35	0.0	1.0	24 724	0.14	0.35	0.0	1.0	4 674	0.14	0.35	0.0	1.0
30-39 years	29 398	0.28	0.45	0.0	1.0	24 724	0.29	0.45	0.0	1.0	4 674	0.22	0.42	0.0	1.0
40-49 years	29 398	0.22	0.41	0.0	1.0	24 724	0.22	0.42	0.0	1.0	4 674	0.19	0.39	0.0	1.0
50-59 years	29 398	0.14	0.34	0.0	1.0	24 724	0.13	0.34	0.0	1.0	4 674	0.14	0.35	0.0	1.0
60-64 years	29 398	0.07	0.25	0.0	1.0	24 724	0.06	0.25	0.0	1.0	4 674	0.09	0.29	0.0	1.0
≥ 65 years	29 398	0.15	0.36	0.0	1.0	24 724	0.14	0.35	0.0	1.0	4 674	0.20	0.40	0.0	1.0
No schooling (head)	29 555	0.06	0.24	0.0	1.0	24 856	0.06	0.24	0.0	1.0	4 699	0.05	0.21	0.0	1.0
Primary educ. (head)	29 555	0.34	0.47	0.0	1.0	24 856	0.34	0.47	0.0	1.0	4 699	0.34	0.47	0.0	1.0
Secondary educ. (head)	29 555	0.48	0.50	0.0	1.0	24 856	0.48	0.50	0.0	1.0	4 699	0.50	0.50	0.0	1.0
Tertiary education (head)	29 555	0.12	0.32	0.0	1.0	24 856	0.12	0.33	0.0	1.0	4 699	0.11	0.32	0.0	1.0
Hh. has member with tertiary educ	29 538	0.08	0.26	0.0	1.0	24 842	0.07	0.26	0.0	1.0	4 696	0.10	0.30	0.0	1.0
Female share (16years+)	29 538	0.34	0.23	0.0	1.0	24 842	0.33	0.22	0.0	1.0	4 696	0.38	0.24	0.0	1.0
Elderly share (65 years+)	29 538	0.07	0.18	0.0	1.0	24 842	0.06	0.18	0.0	1.0	4 696	0.09	0.20	0.0	1.0
Unemployed (head)	27 884	0.03	0.16	0.0	1.0	23 831	0.02	0.13	0.0	1.0	4 053	0.07	0.25	0.0	1.0
Number of unemployed hh. members	29 538	0.13	0.44	0.0	6.0	24 842	0.11	0.40	0.0	6.0	4 696	0.22	0.57	0.0	5.0
Share of unemployed adults in hh.	29 538	0.04	0.15	0.0	1.0	24 842	0.04	0.13	0.0	1.0	4 696	0.08	0.21	0.0	1.0
Household size	29 538	4.20	2.09	1.0	10.0	24 842	4.22	2.08	1.0	10.0	4 696	4.15	2.10	1.0	10.0
Number of adults (16 years +)	29 538	2.40	1.20	1.0	10.0	24 842	2.41	1.18	1.0	10.0	4 696	2.39	1.28	1.0	9.0
Number of children < 6 years	29 555	0.72	0.82	0.0	9.0	24 856	0.73	0.81	0.0	9.0	4 699	0.67	0.85	0.0	7.0
Per-capita household income	29 538	86	263	0	5 000	24 842	88	278	0	5 000	4 696	78	172	0	4 552
Household owns land	29 555	0.43	0.49	0.0	1.0	24 856	0.44	0.50	0.0	1.0	4 699	0.36	0.48	0.0	1.0
Urban	29 538	0.34	0.47	0.0	1.0	24 842	0.31	0.46	0.0	1.0	4 696	0.47	0.50	0.0	1.0
Bulawayo	29 538	0.06	0.23	0.0	1.0	24 842	0.04	0.20	0.0	1.0	4 696	0.11	0.32	0.0	1.0

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Manicaland	29 538	0.14	0.35	0.0	1.0	24 842	0.14	0.35	0.0	1.0	4 696	0.14	0.34	0.0	1.0
Mashonaland Central	29 538	0.09	0.29	0.0	1.0	24 842	0.11	0.31	0.0	1.0	4 696	0.03	0.18	0.0	1.0
Mashonaland East	29 538	0.12	0.32	0.0	1.0	24 842	0.12	0.33	0.0	1.0	4 696	0.09	0.29	0.0	1.0
Mashonaland West	29 538	0.11	0.31	0.0	1.0	24 842	0.11	0.32	0.0	1.0	4 696	0.09	0.29	0.0	1.0
Matebeleland North	29 538	0.05	0.22	0.0	1.0	24 842	0.05	0.21	0.0	1.0	4 696	0.06	0.23	0.0	1.0
Matebeleland South	29 538	0.05	0.22	0.0	1.0	24 842	0.06	0.23	0.0	1.0	4 696	0.03	0.16	0.0	1.0
Midlands	29 538	0.11	0.31	0.0	1.0	24 842	0.10	0.30	0.0	1.0	4 696	0.16	0.37	0.0	1.0
Masvingo	29 538	0.12	0.33	0.0	1.0	24 842	0.12	0.33	0.0	1.0	4 696	0.10	0.30	0.0	1.0
Harare	29 538	0.15	0.36	0.0	1.0	24 842	0.15	0.35	0.0	1.0	4 696	0.19	0.39	0.0	1.0

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Table 3: Summary statistics 2011

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Treatment variables															
Remittances domestic (\$)	29 652	16.1	65.0	0.0	535	23 045	0.00	0.00	0.0	0.0	6 607	69.0	120.1	0.0	535
Remittances international (\$)	29 652	10.0	76.4	0.0	1 775	23 045	0.00	0.00	0.0	0.0	6 607	42.9	153.4	0.0	1 775
Remittances (domestic + international - \$)	29 652	26.2	100.1	0.0	1 935	23 045	0.00	0.00	0.0	0.0	6 607	111.8	182.3	0.2	1 935
HH remittances recipient	29 652	0.23	0.42	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	1.00	0.00	1.0	1.0
HH remittances recipient (domestic)	29 652	0.19	0.39	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	0.81	0.39	0.0	1.0
HH remittances recipient (international)	29 652	0.05	0.22	0.0	1.0	23 045	0.00	0.00	0.0	0.0	6 607	0.22	0.41	0.0	1.0
Outcome variables:															
Food exp. (\$)	29 649	102.8	69.7	1.9	556	23 043	100.4	68.3	2.2	556	6 606	110.7	73.7	1.9	556
Non-food exp. (\$)	29 652	180.6	241.3	0.0	1 990	23 045	168.1	229.6	0.0	1 990	6 607	221.4	272.0	0.0	1 984
Total exp. (\$)	29 652	283.3	278.0	20.0	2 515	23 045	268.5	266.0	20.0	2 515	6 607	332.1	309.4	25.5	2 298
Education exp (\$)	29 652	14.6	62.2	0.0	956	23 045	13.9	61.6	0.0	956	6 607	16.7	64.2	0.0	956
Health exp. (\$)	29 652	4.9	27.8	0.0	1 293	23 045	4.5	27.0	0.0	1 067	6 607	6.3	30.2	0.0	1 293
Durables exp. (\$)*	29 652	21.2	69.3	0.0	1 865	23 045	20.8	68.8	0.0	1 865	6 607	22.6	71.2	0.0	1 369
Per capita food exp. (\$)	29 629	31.5	36.1	0.5	556	23 025	30.5	35.5	0.5	556	6 604	34.6	37.8	0.5	556
Per capita total exp. (\$)	29 632	86.5	122.0	2.5	2 169	23 027	80.9	114.7	2.5	2 169	6 605	104.9	141.8	3.2	1 772
Food share to total exp.	29 649	0.46	0.20	0.00	1.00	23 043	0.47	0.20	0.0	1.0	6 606	0.43	0.20	0.0	1.0
Other characteristics:															
Male headed hh	29 632	0.62	0.49	0.0	1.0	23 027	0.63	0.48	0.0	1.0	6 605	0.60	0.49	0.0	1.0
Female headed hh	29 632	0.38	0.49	0.0	1.0	23 027	0.37	0.48	0.0	1.0	6 605	0.40	0.49	0.0	1.0
Age (head) 16-19 years	29 414	0.01	0.11	0.0	1.0	22 864	0.01	0.11	0.0	1.0	6 550	0.01	0.11	0.0	1.0
20-29 years	29 414	0.16	0.37	0.0	1.0	22 864	0.16	0.36	0.0	1.0	6 550	0.17	0.38	0.0	1.0

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
30-39 years	29 414	0.26	0.44	0.0	1.0	22 864	0.26	0.44	0.0	1.0	6 550	0.24	0.43	0.0	1.0
40-49 years	29 414	0.19	0.39	0.0	1.0	22 864	0.19	0.39	0.0	1.0	6 550	0.20	0.40	0.0	1.0
50-59 years	29 414	0.15	0.36	0.0	1.0	22 864	0.16	0.36	0.0	1.0	6 550	0.15	0.36	0.0	1.0
60-64 years	29 414	0.06	0.24	0.0	1.0	22 864	0.06	0.24	0.0	1.0	6 550	0.06	0.25	0.0	1.0
≥ 65 years	29 414	0.16	0.37	0.0	1.0	22 864	0.17	0.37	0.0	1.0	6 550	0.16	0.37	0.0	1.0
No schooling (head)	26 795	0.05	0.23	0.0	1.0	20 788	0.05	0.22	0.0	1.0	6 007	0.06	0.24	0.0	1.0
Primary educ. (head)	26 795	0.41	0.49	0.0	1.0	20 788	0.41	0.49	0.0	1.0	6 007	0.40	0.49	0.0	1.0
Secondary educ. (head)	26 795	0.46	0.50	0.0	1.0	20 788	0.46	0.50	0.0	1.0	6 007	0.47	0.50	0.0	1.0
Tertiary education (head)	26 795	0.07	0.26	0.0	1.0	20 788	0.08	0.26	0.0	1.0	6 007	0.07	0.25	0.0	1.0
Hh. has member with tertiary educ	29 632	0.08	0.27	0.0	1.0	23 027	0.08	0.27	0.0	1.0	6 605	0.08	0.26	0.0	1.0
Female share (16years+)	29 632	0.33	0.21	0.0	1.0	23 027	0.33	0.21	0.0	1.0	6 605	0.33	0.21	0.0	1.0
Elderly share (65 years+)	29 632	0.06	0.17	0.0	1.0	23 027	0.06	0.17	0.0	1.0	6 605	0.07	0.17	0.0	1.0
Unemployed (head)	27 903	0.01	0.11	0.0	1.0	21 706	0.01	0.11	0.0	1.0	6 197	0.01	0.11	0.0	1.0
Number of unemployed hh. members	29 632	0.07	0.32	0.0	6.0	23 027	0.07	0.32	0.0	6.0	6 605	0.07	0.32	0.0	4.0
Share of unemployed adults in hh.**	29 548	0.02	0.11	0.0	1.0	22 960	0.02	0.10	0.0	1.0	6 588	0.02	0.11	0.0	1.0
Household size	29 632	4.58	2.30	1.0	15.0	23 027	4.61	2.29	1.0	15.0	6 605	4.49	2.30	1.0	15.0
Number of adults (16 years +)	29 632	2.56	1.31	0.0	12.0	23 027	2.56	1.30	0.0	12.0	6 605	2.54	1.31	0.0	12.0
Number of children < 6 years	29 632	0.67	0.78	0.0	7.0	23 027	0.67	0.78	0.0	7.0	6 605	0.65	0.77	0.0	5.0
Per capita household income	29 632	59.09	196.70	0.0	6 881	23 027	52.00	180.47	0.0	6 000	6 605	82.27	240.91	0.0	6 881
Household owns land	29 652	0.64	0.48	0.0	1.0	23 045	0.64	0.48	0.0	1.0	6 607	0.65	0.48	0.0	1.0
Urban	29 652	0.35	0.48	0.0	1.0	23 045	0.33	0.47	0.0	1.0	6 607	0.42	0.49	0.0	1.0

	Overall					Non- recipient household					Remittance recipient household				
	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max	Obs.	Mean	SD	Min	Max
Bulawayo	29 652	0.06	0.23	0.0	1.0	23 045	0.05	0.21	0.0	1.0	6 607	0.10	0.30	0.0	1.0
Manicaland	29 652	0.15	0.36	0.0	1.0	23 045	0.16	0.37	0.0	1.0	6 607	0.13	0.34	0.0	1.0
Mashonaland Central	29 652	0.09	0.29	0.0	1.0	23 045	0.09	0.29	0.0	1.0	6 607	0.08	0.28	0.0	1.0
Mashonaland East	29 652	0.09	0.29	0.0	1.0	23 045	0.09	0.29	0.0	1.0	6 607	0.09	0.29	0.0	1.0
Mashonaland West	29 652	0.11	0.32	0.0	1.0	23 045	0.12	0.33	0.0	1.0	6 607	0.09	0.28	0.0	1.0
Matebeleland North	29 652	0.05	0.21	0.0	1.0	23 045	0.05	0.21	0.0	1.0	6 607	0.05	0.22	0.0	1.0
Matebeleland South	29 652	0.05	0.22	0.0	1.0	23 045	0.06	0.23	0.0	1.0	6 607	0.03	0.17	0.0	1.0
Midlands	29 652	0.12	0.33	0.0	1.0	23 045	0.12	0.32	0.0	1.0	6 607	0.14	0.34	0.0	1.0
Masvingo	29 652	0.11	0.32	0.0	1.0	23 045	0.11	0.31	0.0	1.0	6 607	0.12	0.33	0.0	1.0
Harare	29 652	0.16	0.36	0.0	1.0	23 045	0.15	0.36	0.0	1.0	6 607	0.17	0.37	0.0	1.0

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Notes: *Consists of expenditure on clothing and footwear, furniture (e.g. stoves, refrigerators, solar panels), transport equipment (e.g. cars, bicycles) and electronics (e.g. radio, television, cell phones, computers). ** Number unemployed (age 16+)/ number of adults in hh (age 16+) : share female= number of females/household size.

Table 4: Expenditure patterns by remittance status in Zimbabwe

	2011					2017				
	non-Recipient	Recipient	diff	t-value	p-value	non-Recipient	Recipient	diff	t-value	p-value
Food exp. (\$)	97.0	106.0	9.038	9.7	0.000	84.1	92.4	8.255	8.8	0.000
Non-food exp. (\$)	133.1	167.2	34.140	12.7	0.000	130.0	164.9	34.913	15.4	0.000
Total exp. (\$)	230.1	273.3	43.171	13.6	0.000	214.1	257.2	43.168	15.7	0.000
Education exp (\$)	11.2	13.9	2.661	3.3	0.001	14.9	18.6	3.670	8.6	0.000
Health exp. (\$)	4.0	5.9	1.967	4.9	0.000	3.4	5.7	2.292	5.3	0.000
Durables exp. (\$)*	16.8	18.5	1.792	2.0	0.045	64.5	75.6	11.104	4.7	0.000
Per capita food exp. (\$)	29.4	32.3	-2.916	6.2	0.000	24.0	26.7	2.700	7.8	0.000
Per capita total exp. (\$)	69.6	83.6	14.035	10.0	0.000	64.2	77.0	12.760	11.0	0.000
Education share to total exp.	0.027	0.031	-0.003	3.0	0.003	0.071	0.074	0.003	2.0	0.047
Health share to total exp.	0.011	0.015	0.004	5.8	0.000	0.008	0.012	0.003	5.5	0.000
Food share to total exp.	0.504	0.471	-0.033	-12.7	0.000	0.437	0.405	-0.032	-12.2	0.000

Source: Own calculations from the PICES 2011 and 2017 Survey Data

Table 5: Estimation of the propensity score for 2011

VARIABLES	Domestic recipient	International recipient	Remittance recipient
Household size	-0.013 (-0.523)	-0.030 (-0.710)	-0.016 (-0.646)
Urban	0.087*** (3.424)	0.284*** (7.376)	0.125*** (5.198)
Tertiary Education HH Head	0.009 (0.262)	0.019 (0.350)	0.018 (0.545)
Unemployment share	0.074 (0.682)	-0.040 (-0.218)	0.048 (0.449)
Unemployed head	0.003 (0.033)	-0.011 (-0.063)	0.004 (0.041)
Adults (> 15 years)	0.016* (1.656)	-0.006 (-0.370)	0.014 (1.394)
Children (<6 years)	-0.016 (-1.192)	0.004 (0.176)	-0.014 (-1.072)
Female head	0.845 (0.958)	0.002 (0.055)	0.041** (2.033)
Female share	-0.810 (-0.919)	0.080 (0.954)	-0.012 (-0.244)
Elderly share (> 65 years)	-0.031 (-0.556)		
Number of elderly (> 65 years)		-0.054* (-1.687)	-0.020 (-1.097)
Provincial control	Yes	Yes	Yes
Constant	-0.875*** (-28.431)	-1.987*** (-37.214)	-0.996*** (-28.584)
LR Chi2()	232.68***	503.41***	363.25***
Pseudo R-squared	0.09	0.05	0.01
Log-likelihood	-13338.08	-4399.76	-14562.55
Observations	27,842	27,842	27,842

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6: Estimation of the propensity score (probit) for 2017

VARIABLES	Domestic Recipient	International Recipient	Remittance Recipient
Household size	0.058*	0.156***	0.030***
	(1.703)	(4.538)	(5.134)
Urban	0.050	0.480***	0.025
	(1.326)	(11.203)	(0.689)
Tertiary Education HH member	-0.014	0.145**	0.219***
	(-0.275)	(2.325)	(4.375)
Female share (>15 years)	-0.099*	-0.199**	0.390***
	(-1.684)	(-2.473)	(8.080)
Unemployment share	-0.027	0.236**	0.111
	(-0.206)	(2.114)	(0.909)
Pov_emp_member	-0.254***	-0.224***	-0.337***
	(-4.768)	(-2.961)	(-6.549)
Female head	0.422***	0.582***	
	(17.068)	(15.014)	
Own land	0.047*	0.027	0.047**
	(1.898)	(0.721)	(2.010)
Children (<6 years)	-0.011	-0.038*	-0.011
	(-0.732)	(-1.859)	(-0.799)
percap_cons_r	0.001***	-0.000	-0.000
	(3.556)	(-0.879)	(-0.395)
Elderly share (> 65 years)	0.333***		0.271***
	(5.906)		(4.975)
Unemp_head	0.639***		0.579***
	(5.641)		(5.336)
Adults (>15 years)	0.027**		
	(2.144)		
Education	-0.015	0.289***	0.543***
	(-1.132)	(3.911)	(4.691)
Provincial controls	Yes	No	Yes

VARIABLES	Domestic Recipient	International Recipient	Remittance Recipient
Education squared		-0.041***	-0.101***
		(-3.518)	(-3.965)
Hsize*female head		-0.013	
		(-1.575)	
Married			-0.221***
			(-9.722)
Tertiary education head			0.246
			(1.268)
Constant	-1.361***	-2.789***	-1.372***
	(-22.397)	(-21.700)	(-9.395)
LR chi2(k)	1150.79***	576.16***	1164.74***
Pseudo R-squared	0.06	0.07	0.052
Log likelihood	-9655.78	-4060.85	-107047.36
Observations	27,884	29,538	27,218

z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7: PSM Estimates of ATT by type of Treatment (Recipient, Domestic Recipient, and International Recipient) for 2011 and 2017

	Food		Durables		Education		Health	
	2011	2017	2011	2017	2011	2017	2011	2017
Recipient (domestic, international or both)								
Nearest Neighbour	7.576*** (1.15)	5.534*** (1.27)	0.304 (1.10)	10.853** (3.97)	2.051** (1.02)	2.924*** (0.49)	1.810** (0.54)	1.438* (0.59)
Caliper	7.684*** (1.02)	6.264*** (1.10)	0.327 (0.96)	8.527** (3.55)	1.776* (0.91)	1.893*** (0.44)	1.500*** (0.48)	1.308* (2.48)
Kernel	9.964*** (1.13)	6.553*** (1.03)	1.331 (0.89)	8.357** (2.22)	2.606*** (0.82)	2.287*** (0.53)	1.823*** (0.44)	1.401** (0.42)
Domestic Recipient								
Nearest Neighbour	5.688*** (1.18)	2.852* (1.54)	0.926 (1.05)	-4.910 (3.69)	-0.477 (0.99)	0.296 (0.60)	1.196* (0.53)	0.878 (0.74)
Caliper	5.539*** (1.07)	3.946*** (1.13)	-0.459 (0.95)	-2.33 (2.50)	-0.270 (0.89)	0.593 (0.40)	1.141* (0.49)	0.419 (0.59)
Kernel	6.316*** (0.99)	4.769*** (1.12)	0.181 (0.88)	-1.838 (1.31)	0.326 (0.33)	0.954 (0.50)	1.367** (0.48)	0.811 (0.70)
International Recipient								
Nearest Neighbour	18.146*** (2.56)	7.077** (3.09)	5.082* (2.94)	28.123*** (8.24)	9.839*** (2.71)	3.997** (1.79)	3.940** (1.47)	3.480* (1.39)
Caliper	17.943*** (2.31)	14.796*** (2.43)	5.799* (2.75)	42.977*** (6.48)	7.608** (2.59)	6.109*** (1.48)	3.945** (1.39)	2.971* (1.30)
Kernel	20.204*** (2.11)	17.651*** (2.31)	7.430	57.100*** (5.69)	10.297*** (2.68)	9.702*** (1.61)	4.673*** (1.21)	3.851* (1.39)

Notes: Robust standard errors in brackets

Table 8: Quality of matching test for the propensity score matching based on the Nearest Neighbour Matching Estimator

Pscore for each treatment		Treated	Control	%bias	% reduct bias	t-test	p>t	V(T)/V(C)
Recipient	Unmatched	0.2325	0.2191	27.1		19.46	0.000	1.27
	Matched	0.2325	0.2325	0.0	100	0.00	1.000	1.00
Domestic	Unmatched	0.19434	0.1863	23.7		14.81	0.000	0.76
	Matched	0.19434	0.19435	-0.0	99.9	-0.01	0.990	1.00
International	Unmatched	0.0633	0.0387	57.4		26.03	0.000	3.21
	Matched	0.0625	0.06326	-0.0	100	-0.00	1.000	1.00

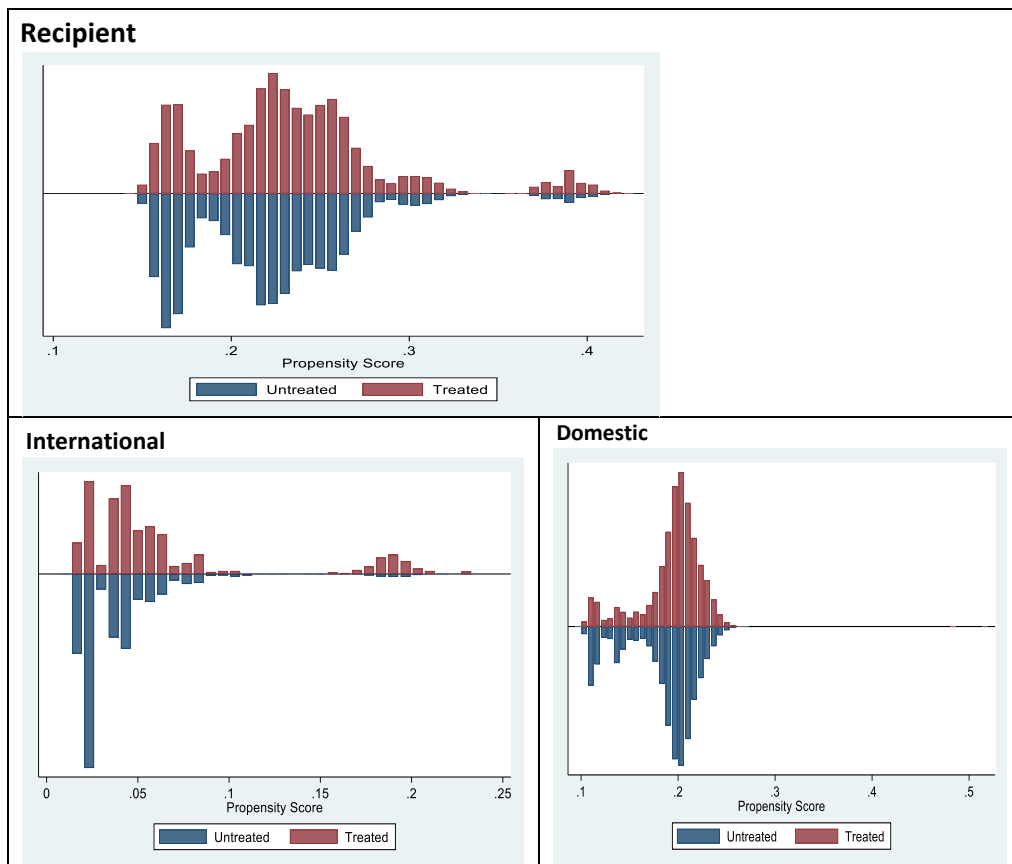
FIGURES**Figure 1: Common support for each treatment category**

Table 9: Mixed multinomial logit regression for treatments (First Step) for 2011 Data

VARIABLES	Durables		Food		Health		Education	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	-0.011	-0.065	-0.012	-0.074	-0.012	-0.070	-0.013	-0.068
	(-0.219)	(-0.655)	(-0.234)	(-0.754)	(-0.242)	(-0.710)	(-0.252)	(-0.681)
Urban	0.155***	0.585***	0.197***	0.653***	0.187***	0.597***	0.174***	0.592***
	(3.159)	(6.657)	(4.033)	(7.463)	(3.859)	(6.828)	(3.552)	(6.764)
Tertiary Education HH Member	0.020	0.088	0.024	0.099	0.023	0.087	0.025	0.079
	(0.299)	(0.659)	(0.357)	(0.752)	(0.332)	(0.651)	(0.372)	(0.590)
Female head	0.074**	0.089	0.077**	0.106	0.077**	0.092	0.076**	0.091
	(1.968)	(1.190)	(2.026)	(1.431)	(2.024)	(1.220)	(2.016)	(1.214)
Unemp_share	0.129	-0.264	0.136	-0.251	0.122	-0.261	0.137	-0.254
	(0.574)	(-0.575)	(0.599)	(-0.559)	(0.535)	(-0.573)	(0.608)	(-0.554)
Unemp_head	0.053	0.112	0.039	0.101	0.049	0.104	0.041	0.098
	(0.251)	(0.258)	(0.183)	(0.236)	(0.230)	(0.239)	(0.190)	(0.225)
Elderly share	-0.082	-0.408*	-0.080	-0.379	-0.084	-0.406*	-0.083	-0.404*
	(-0.727)	(-1.705)	(-0.701)	(-1.613)	(-0.742)	(-1.699)	(-0.731)	(-1.691)
Adults (> 15 years)	0.029	-0.019	0.029	-0.017	0.029	-0.017	0.029	-0.018
	(1.453)	(-0.453)	(1.442)	(-0.426)	(1.477)	(-0.401)	(1.463)	(-0.427)
Children (< 6 years)	-0.035	-0.002	-0.035	0.002	-0.035	-0.000	-0.035	0.000
	(-1.283)	(-0.034)	(-1.284)	(0.030)	(-1.288)	(-0.000)	(-1.284)	(0.005)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.868***	-3.312***	-1.876***	-3.324***	-1.875***	-3.314***	-1.869***	-3.313***
	(-29.693)	(-28.322)	(-29.626)	(-28.696)	(-29.677)	(-28.352)	(-29.680)	(-28.344)
Log pseudolikelihood	10853.82	10853.82	-5144.82	-5144.82	29301.19	29302.19	15942.44	15943.44
Wald chi2	2449.43***	2449.43***	14765.67***	14765.67***	1169.71***	1169.71***	1665.41***	1665.41***
Observations	27,687	27,687	27,684	27,684	27,687	27,687	27,687	27,687

Robust z-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10: Mixed multinomial logit regression for treatments (First Step) for 2017 Data

VARIABLES	Durables	Food		Health		Education		
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	0.147** (2.450)	0.482*** (4.201)	0.143** (2.385)	0.480*** (4.199)	0.143** (2.382)	0.483*** (4.208)	-0.109 (-0.970)	0.280 (1.430)
Urban	0.051 (0.734)	0.399*** (3.096)	0.056 (0.807)	0.414*** (3.077)	0.053 (0.764)	0.401*** (3.103)	0.060 (0.686)	0.473*** (3.081)
Tertiary Education HH Member	-0.037 (-0.376)	0.188 (1.151)	-0.039 (-0.395)	0.176 (1.062)	-0.035 (-0.359)	0.190 (1.160)	0.026 (0.249)	0.317* (1.826)
Female head	0.865*** (19.465)	1.228*** (14.342)	0.865*** (19.437)	1.231*** (14.328)	0.864*** (19.432)	1.229*** (14.345)	0.871*** (16.090)	1.275*** (12.453)
Unemp_share	-0.079 (-0.313)	0.436 (1.029)	-0.093 (-0.367)	0.424 (0.993)	-0.087 (-0.345)	0.438 (1.033)	-0.416 (-1.205)	0.888* (1.729)
Unemp_head	1.448*** (6.779)	0.900** (2.340)	1.454*** (6.780)	0.890** (2.304)	1.456*** (6.803)	0.897** (2.336)	1.330*** (4.809)	0.435 (0.927)
Elderly share	0.731*** (6.590)	0.570** (2.408)	0.724*** (6.516)	0.566** (2.399)	0.725*** (6.530)	0.570** (2.411)	0.942*** (4.074)	0.545 (1.249)
Adults (> 15 years)	0.034 (1.370)	-0.043 (-1.000)	0.035 (1.406)	-0.042 (-0.970)	0.034 (1.387)	-0.044 (-1.013)	0.066** (2.224)	-0.037 (-0.737)
Children (< 6 years)	-0.036 (-1.144)	-0.032 (-0.536)	-0.035 (-1.112)	-0.032 (-0.540)	-0.035 (-1.114)	-0.032 (-0.543)	0.030 (0.835)	0.017 (0.257)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.028*** (-38.848)	-5.049*** (-31.497)	-3.024*** (-38.726)	-5.055*** (-31.306)	-3.023*** (-38.768)	-5.050*** (-31.480)	-2.727*** (-18.645)	-4.821*** (-17.527)
Log pseudolikelihood	-33356.97	-33355.97	2087.43	2088.43	40641.88	40642.88	14837.3	14838.3
Wald chi2	2301.98***	2301.98***	13438.22***	13438.22***	1778.95***	1778.95***	2278.92***	2278.92***
Observations	27,783	27,783	27,783	27,783	27,783	27,783	18,722	18,722

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 11: Selectivity corrected estimated of budget share equations (2011)

VARIABLES	Durables	Food	Health	Education
Domestic recipient	0.025*** (12.488)	-0.037*** (-3.673)	0.009*** (8.427)	0.019*** (10.796)
International recipient	-0.025*** (-6.723)	0.092*** (12.002)	-0.001 (-0.521)	-0.002 (-0.538)
log_hsize	-0.001 (-0.424)	-0.002 (-0.615)	0.001 (1.169)	-0.001 (-0.510)
log_tot_exp	0.043*** (35.377)	-0.102*** (-63.726)	0.011*** (16.366)	0.032*** (28.536)
Urban	0.009*** (4.250)	-0.101*** (-33.855)	0.001 (0.695)	0.001 (0.451)
Tertiary Education HH Member	-0.000 (-0.164)	0.003 (0.832)	0.000 (0.130)	-0.002 (-1.018)
Female head	0.001 (0.969)	-0.000 (-0.195)	-0.000 (-0.510)	0.000 (0.439)
Unemp_share	0.004 (0.539)	0.007 (0.568)	0.006 (1.341)	-0.007 (-1.387)
Unemp_head	-0.010** (-1.980)	0.010 (0.896)	-0.004 (-1.042)	0.003 (0.499)
Elderly share	0.002 (0.490)	-0.004 (-0.686)	-0.000 (-0.169)	0.000 (0.032)
Adults (> 15 years)	-0.001 (-1.046)	0.001 (1.339)	-0.001** (-2.264)	0.000 (0.586)
Children (< 6 years)	0.001 (1.083)	-0.002 (-1.394)	-0.000 (-0.073)	0.002** (2.349)
Provincial controls	Yes	Yes	Yes	Yes
Insignia	-2.507*** (-185.496)	-2.281*** (-33.090)	-3.102*** (-115.340)	-2.653*** (-162.896)
lambda_category2	-0.037*** (-21.044)	0.034*** (3.117)	-0.008*** (-9.833)	-0.024*** (-15.882)
lambda_category3	0.007*** (2.776)	-0.119*** (-18.991)	0.002* (1.812)	0.003* (1.680)
Constant	-0.185*** (-22.832)	1.016*** (96.954)	-0.050*** (-12.732)	-0.148*** (-21.172)
Observations	27,687	27,684	27,687	27,687

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 12: Selectivity corrected estimated of budget share equations (2017)

VARIABLES	Durables	Food	Health	Education
Domestic	-0.022**	0.060**	0.009***	0.001
	(-2.436)	(2.403)	(4.378)	(0.461)
International	-0.059***	0.083***	0.010***	-0.002
	(-2.901)	(3.217)	(2.590)	(-0.799)
log_hsize	0.052***	-0.097***	0.062***	-0.005***
	(20.809)	(-10.128)	(21.624)	(-6.993)
log_tot_exp	-0.071***	0.066***	-0.027***	0.016***
	(-39.126)	(11.098)	(-26.010)	(17.848)
Urban	-0.090***	0.079***	0.039***	-0.005***
	(-31.307)	(5.944)	(16.190)	(-4.945)
Tertiary Education HH Member	-0.040***	0.112***	0.016***	0.000
	(-10.808)	(6.568)	(5.556)	(0.077)
Female head	-0.002	-0.042***	0.011***	0.001*
	(-1.050)	(-6.322)	(9.867)	(1.958)
Unemp_share	-0.055***	-0.051	-0.037***	0.003
	(-5.636)	(-1.122)	(-4.956)	(0.893)
Unemp_head	0.026***	0.027	0.007	-0.000
	(2.682)	(0.624)	(1.003)	(-0.110)
Eldershare	0.016***	-0.174***	-0.023***	0.003**
	(3.080)	(-12.295)	(-4.001)	(2.566)
Adults (> 15 years)	-0.004***	0.003	-0.003***	-0.000
	(-3.777)	(0.747)	(-5.072)	(-0.319)
Children (< 6 years)	0.007***	0.030***	-0.017***	0.000
	(5.513)	(7.315)	(-24.817)	(0.335)
Provincial controls	Yes	Yes	Yes	Yes
Insigma	-1.974***	-0.678***	-2.687***	-3.334***
	(-66.989)	(-19.968)	(-73.212)	(-109.365)
lambda_category2	0.021**	-0.066**	-0.007***	0.000
	(2.232)	(-2.489)	(-5.490)	(0.152)
lambda_category3	0.027	0.018	0.001	0.001
	(1.329)	(1.212)	(0.428)	(1.096)
Constant	0.719***	-0.070*	0.140***	-0.071***
	(71.307)	(-1.885)	(14.859)	(-15.618)
Observations	27,783	27,783	18,722	27,783

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 13: Mixed multinomial logit regression results for treatments using distance to the Post Office as the Instrumental Variable (First Step) for 2011 Data

VARIABLES	Durables		Food		Health		Education	
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsiz	-0.013	-0.066	-0.014	-0.072	-0.013	-0.070	-0.012	-0.070
	(-0.255)	(-0.662)	(-0.273)	(-0.734)	(-0.256)	(-0.708)	(-0.245)	(-0.700)
Urban	-0.090*	0.585***	-0.056	0.675***	-0.053	0.588***	-0.048	0.588***
	(-1.672)	(5.873)	(-1.049)	(6.943)	(-0.997)	(5.910)	(-0.892)	(5.899)
Tertiary Education HH Member	0.031	0.094	0.034	0.112	0.033	0.094	0.033	0.094
	(0.447)	(0.707)	(0.499)	(0.850)	(0.481)	(0.706)	(0.480)	(0.701)
Female head	0.073*	0.092	0.075**	0.109	0.075**	0.091	0.075**	0.091
	(1.942)	(1.224)	(1.977)	(1.470)	(1.988)	(1.215)	(1.976)	(1.215)
Unemp_share	0.134	-0.354	0.129	-0.321	0.130	-0.357	0.144	-0.356
	(0.592)	(-0.764)	(0.567)	(-0.706)	(0.570)	(-0.773)	(0.636)	(-0.770)
Unemp_head	0.049	0.159	0.037	0.140	0.041	0.158	0.034	0.158
	(0.232)	(0.367)	(0.173)	(0.326)	(0.190)	(0.365)	(0.157)	(0.363)
Elderly share	-0.083	-0.404*	-0.082	-0.382	-0.083	-0.406*	-0.077	-0.406*
	(-0.734)	(-1.693)	(-0.717)	(-1.631)	(-0.727)	(-1.702)	(-0.679)	(-1.701)
Adults (> 15 years)	0.027	-0.019	0.027	-0.019	0.027	-0.018	0.026	-0.018
	(1.348)	(-0.467)	(1.363)	(-0.473)	(1.353)	(-0.428)	(1.327)	(-0.433)
Children (< 6 years)	-0.035	-0.001	-0.035	0.001	-0.036	-0.000	-0.035	-0.001
	(-1.296)	(-0.021)	(-1.266)	(0.013)	(-1.306)	(-0.005)	(-1.285)	(-0.010)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to post office	-0.008***	-0.000	-0.009***	0.000	-0.008***	-0.000	-0.008***	-0.000
	(-10.928)	(-0.281)	(-10.843)	(0.366)	(-10.743)	(-0.290)	(-10.623)	(-0.290)
Constant	-1.564***	-3.300***	-1.554***	-3.341***	-1.574***	-3.298***	-1.579***	-3.298***
	(-22.649)	(-25.703)	(-22.121)	(-26.749)	(-22.653)	(-25.650)	(-22.665)	(-25.649)
Observations	27,631	27,631	27,628	27,628	27,631	27,631	27,631	27,631

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 14: Selectivity corrected estimates of budget share equations (2011) IV corrected using distance to post office as the instrumental variable

VARIABLES	Durables	Food	Health	Education
Domestic	0.027***	-0.048***	0.009***	-0.005**
	(13.643)	(-6.805)	(7.433)	(-2.229)
International	-0.021***	0.096***	0.001	0.001
	(-5.783)	(12.535)	(0.363)	(0.171)
log_hsiz	-0.001	-0.002	0.001	-0.001
	(-0.407)	(-0.684)	(1.158)	(-0.564)
log_tot_exp	0.043***	-0.102***	0.011***	0.032***
	(35.297)	(-63.964)	(16.348)	(28.478)
Urban	0.009***	-0.100***	0.001	0.001
	(4.249)	(-33.589)	(0.716)	(0.736)
Tertiary Education HH Member	-0.001	0.003	0.000	-0.002
	(-0.379)	(0.804)	(0.146)	(-0.948)
Female head	0.001	-0.000	-0.000	0.001
	(0.816)	(-0.176)	(-0.504)	(0.736)
Unemp_share	0.004	0.007	0.006	-0.007
	(0.605)	(0.540)	(1.353)	(-1.375)
Unemp_head	-0.011**	0.011	-0.004	0.003
	(-2.019)	(0.925)	(-1.040)	(0.554)
Eldery share	0.002	-0.004	-0.000	-0.000
	(0.531)	(-0.718)	(-0.161)	(-0.027)
Adults (> 15 years)	-0.001	0.002	-0.001**	0.000
	(-1.010)	(1.397)	(-2.229)	(0.838)
Children (< 6 years)	0.001	-0.002	-0.000	0.001**
	(1.091)	(-1.328)	(-0.084)	(2.185)
Provincial controls	Yes	Yes	Yes	Yes
Insignia	-2.515***	-2.412***	-3.100***	-2.604***
	(-182.561)	(-27.457)	(-115.745)	(-171.467)
lambda_category2	-0.039***	0.049***	-0.008***	0.003
	(-22.391)	(6.363)	(-8.743)	(1.445)
lambda_category3	0.003	-0.125***	-0.000	0.000
	(1.114)	(-18.844)	(-0.239)	(0.009)
Constant	-0.186***	1.018***	-0.050***	-0.144***
	(-22.897)	(97.840)	(-12.696)	(-20.730)
Observations	27,631	27,628	27,631	27,631

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 15: Mixed multinomial logit regression results for treatments using the growth point as the IV (First Step) for 2011 Data

VARIABLES	Food			Health		Education		
	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient	Internal Recipient	International Recipient
log_hsize	0.020	-0.067	0.020	-0.066	0.020	-0.068	0.020	-0.064
	(0.380)	(-0.618)	(0.377)	(-0.609)	(0.370)	(-0.630)	(0.369)	(-0.594)
Urban	0.296***	0.547***	0.288***	0.543***	0.293***	0.531***	0.258***	0.537***
	(5.355)	(5.398)	(5.267)	(5.424)	(5.345)	(5.275)	(4.659)	(5.349)
Tertiary Education HH Member	0.001	0.100	0.000	0.106	0.001	0.112	-0.001	0.108
	(0.011)	(0.685)	(0.005)	(0.731)	(0.016)	(0.773)	(-0.018)	(0.746)
Female head	0.073*	0.067	0.073*	0.069	0.073*	0.070	0.070*	0.069
	(1.834)	(0.826)	(1.838)	(0.847)	(1.827)	(0.864)	(1.772)	(0.845)
Unemp_share	0.240	-0.399	0.224	-0.399	0.238	-0.387	0.235	-0.393
	(1.016)	(-0.773)	(0.947)	(-0.772)	(1.008)	(-0.751)	(1.002)	(-0.761)
Unemp_head	-0.057	0.149	-0.047	0.150	-0.056	0.147	-0.041	0.151
	(-0.252)	(0.302)	(-0.208)	(0.305)	(-0.247)	(0.300)	(-0.185)	(0.308)
Eldery share	-0.095	-0.336	-0.097	-0.328	-0.094	-0.329	-0.095	-0.330
	(-0.794)	(-1.301)	(-0.808)	(-1.267)	(-0.780)	(-1.272)	(-0.796)	(-1.276)
Adults (> 15 years)	0.018	-0.020	0.018	-0.019	0.018	-0.019	0.018	-0.020
	(0.877)	(-0.427)	(0.881)	(-0.422)	(0.864)	(-0.413)	(0.869)	(-0.438)
Children (< 6 years)	-0.029	0.028	-0.030	0.028	-0.029	0.028	-0.029	0.028
	(-1.016)	(0.498)	(-1.061)	(0.488)	(-1.033)	(0.494)	(-1.034)	(0.483)
Provincial controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to growth point	-0.005***	-0.001	-0.005***	-0.001	-0.005***	-0.001	-0.005***	-0.001
	(-9.045)	(-0.751)	(-9.148)	(-0.767)	(-9.039)	(-0.721)	(-9.274)	(-0.729)
Constant	-1.667***	-3.281***	-1.665***	-3.283***	-1.667***	-3.280***	-1.655***	-3.284***
	(-23.556)	(-24.648)	(-23.622)	(-24.745)	(-23.616)	(-24.728)	(-23.614)	(-24.743)
Observations	25,423	25,423	25,426	25,426	25,426	25,426	25,426	25,426

Robust z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 16: Selectivity corrected estimates of budget share equations (2011) using distance to the growth point as IV

VARIABLES	Food	Health	Education	Durables
Domestic	-0.035	0.009***	0.004**	0.027***
	(-1.214)	(8.102)	(2.046)	(13.473)
International	-0.060*	0.002	0.015***	-0.022***
	(-1.869)	(0.818)	(3.995)	(-5.470)
log_hsize	-0.003	0.000	-0.000	-0.000
	(-1.146)	(0.398)	(-0.360)	(-0.021)
log_tot_exp	-0.101***	0.011***	0.031***	0.044***
	(-59.412)	(15.763)	(26.989)	(34.260)
Urban	-0.099***	0.001	0.002	0.010***
	(-30.168)	(0.752)	(1.096)	(4.413)
Tertiary Education HH Member	0.004	-0.000	-0.002	0.000
	(0.992)	(-0.231)	(-1.352)	(0.050)
Female head	-0.001	-0.000	0.001	0.001
	(-0.248)	(-0.382)	(0.587)	(0.958)
Unemp_share	0.001	0.006	-0.010**	0.003
	(0.082)	(1.356)	(-1.966)	(0.471)
Unemp_head	0.011	-0.004	0.005	-0.011**
	(0.946)	(-1.218)	(0.946)	(-1.984)
Eldery share	-0.007	-0.000	-0.001	0.002
	(-1.081)	(-0.215)	(-0.177)	(0.679)
Adults (> 15 years)	0.002	-0.001	0.000	-0.001
	(1.602)	(-1.531)	(0.646)	(-1.020)
Children (<6 years)	-0.002	0.000	0.001**	0.001
	(-1.467)	(0.567)	(2.026)	(1.223)
Provincial controls	Yes	Yes	Yes	Yes
Insignia	-1.887***	-3.110***	-2.647***	-2.531***
	(-23.975)	(-109.747)	(-157.563)	(-181.030)
lambda_category2	0.031	-0.009***	-0.008***	-0.039***
	(0.965)	(-10.197)	(-3.877)	(-22.388)
lambda_category3	0.041	-0.001	-0.016***	0.004
	(1.252)	(-1.315)	(-6.581)	(1.452)
Constant	1.029***	-0.052***	-0.151***	-0.206***
	(79.657)	(-11.949)	(-19.468)	(-22.261)
Observations	25,423	25,426	25,426	25,426

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

APPENDIX

Table A1: Data description for the used variables

Variable	Description
Domestic recipient	Dummy variable: 1 if household received domestic remittances, 0 otherwise.
International recipient	Dummy variable: 1 if household received international remittances, 0 otherwise.
Tot_exp	Total household expenditure
Age	Age of household head
Household size	Number of people in a household (hh)
Urban	Dummy variable: 1 if household is located in the urban area, 0 otherwise
Tertiary Education HH Member	Dummy variable: 1 if household has a member with tertiary education, 0 otherwise.
Female share (>15)	Number of females aged 16 years or in the hh divided by household size
Unemployment share	Number of household adults unemployed divided by household size
pov_emp_member	Dummy variable: 1 if household has a paid employee working in a registered/licensed establishment
Female head	Dummy variable: 1 if household head is female, 0 otherwise
Own land	Dummy variable: 1 if household owns a piece of land, 0 otherwise
Children (<6)	Number of household children aged 6 years or less.
percap_cons_r	Total household consumption expenditure divided by household size
Elderly share (>65 years)	Number of adults aged 65 years or more divided by household size
unemp_head	Dummy variable: 1 if household head is unemployed, 0 otherwise
Adults (> 16 years)	Number of adults in the family (16 years or more)
Provincial controls	Control for the provinces in Zimbabwe
Married	Dummy variable: 1 if household head is married, 0 otherwise
Tertiary Education HH head	Dummy variable: 1 if household head has a tertiary level of education, 0 otherwise
Distance to growth point	The distance from the growth point to the household
Distance to post office	The distance from the post office to the household

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